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An analysis of the value of Naval Air Combat Readiness Training

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NAVAL AIR COMBAT READINESS TRAINING

by

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Lieutenant Commander, United States Navy

Submitted in partial fulfillment of
the requirements for the degree of

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IN

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ABSTRACT

The Naval Air Combat Readiness Training Program, "Proficiency Flying," is a firm and legal part of U. S. Naval Aviation and vast quantities of manpower, aircraft, and dollar resources are assembled to enable deck and desk bound Naval Aviators to fly. In the hope of releasing some of these resources to alternative uses, the Program's contribution to combat readiness was investigated. A thorough review of the literature was followed by an analysis of the affect on readiness of selected flight background variables from a sample of 39 pilots undergoing jet replacement squadron transition training. The study concludes that the Naval Air Combat Readiness Training Program is a necessary part of Naval Aviation but certain modifications should be entertained.

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CHAPTER I

STATEMENT OF PURPOSE

Background

Naval Air Combat Readiness Training, based on Public Law and defined in Executive Orders and Navy Directives, is officially accepted as vital to Naval Aviation. Implementation of the concept enables all Naval Aviators to meet certain annual flying requirements designed to maintain minimum levels of flight proficiency. Without such a Proficiency Flying Program pilots would be grounded by periodic rotation to ship, staff, and station assignments thought necessary to: (1) broad professional development, (2) the integration of aviation with the rest of the Navy. Conventionally, such grounded periods would lead to excessive deterioration of complex pilot skills. Long non-flying periods have been contributory to high accident rates and some non-flying aviators have lost all interest in flying. With a Combat Readiness Training (CRT) Program, such skill deterioration may be minimized and maintenance of an immediately accessible cadre of trained pilot and support personnel is possible. Additionally, CRT provides opportunity for the current flying experience thought necessary to the best execution of many ship, station, and staff assignments. Finally, the Program generates significant numbers of morale enhancing shore duty billets for many enlisted ratings. Historically, these arguments, and others, have jelled into a strong case for the continuation of the CRT Program. Vast quantities of manpower, dollars, and equipment have been assembled to provide opportunity for deck and desk bound Naval

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Aviators to fly. Proficiency Flying is a firm and legal part of the conventional wisdom and tradition of U. S. Naval Aviation.

The Naval CRT tradition began and matured in the between war years of isolation and depression when the keystone of National Strategy was mobilization and aviation technology adolescent. Mobilization depended upon a nucleus of trained personnel and pilot rotation not only enhanced individual professional development but also expanded this nucleus while economizing on facilities and equipment. In essence, it was an extension of "buying one aeroplane and allowing the aviators to take turns flying it."[1] The aviation technology of the times facilitated the concept. Though by 1940 most airplanes had closed cockpits and retractable landing gear, a 1920 pilot would not have had much difficulty with a 1940 aircraft. Basic flying skills were easily transferrable from model to model, proficiency in one meant proficiency in many, and rapid mobilization of non-squadron pilots was technically feasible. Successful World War II mobilization reinforced this conceptual keystone of National Strategy and, as an element of that strategy, CRT was born anew in the postwar years. Final and authoritative recognition was received from President Truman in 1950 [23] .

Presidential Executive Order 10152 of August 17, 1950, is rooted in the history of a pre-Nuclear Age reinforced by the experiences of World War II. For the past fourteen years it has been the criterion for military flight proficiency. Yet, in that time there have been

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[1]President Coolidge: c. 1928

marked changes in our National Strategy. Mobilization is no longer the keystone. Most defense analysts assign a very small probability to the recurrence of a World War II type conflict. Strategic deterrence, retaliation, and instant response to local limited crises are the new cornerstones of strategy. Still, our CRT/Proficiency Requirements remain geared to the pre-1950 strategic concept of mobilization.

Since 1950 aviation technology has exploded. In the sophisticated weapons systems of 1964 flying skills are no longer so easily transferred from model to model. In fact, Replacement Training Squadrons (RAGs) have been established to properly and safely transition pilots into unfamiliar aircraft models. Air Type Commanders place stringent restrictions on model transitions outside the purview of the RAG. Yet, the CRT concept is based upon historical premises prevalent when any competent aviator could (and did) say, "Show me how to start it and I'll fly it!" The equipment and the attitudes have changed but CRT has not.

Purpose of the Study

A concept unchanged in the face of shifting strategies, attitudes, and technology raises the possibility of streamlining and economy. Common sense suggested examination of the possibility; the President, the Secretary of the Navy, and the Chief of Naval Operations demanded it:

> THE PRESIDENT HAS STATED CLEARLY HIS OBJECTIVES ON ECONOMY IN WHICH FRUGALITY IS EXPECTED AT ALL ECHELONS . . . SECNAV AND THE CNO ARE DETERMINED THAT THE NAVY SHALL DO LIKEWISE. IN THE FACE OF INCREASING COSTS THE NAVY MUST IMPROVE ITS ABILITY TO MEET CURRENT COMMITMENTS WITH LEAST

COST AND WITHIN APPROVED RESOURCES. THE ANSWER LIES IN RUTHLESS ELIMINATION OF THOSE COSTS WHICH DO NOT ENHANCE COMBAT READINESS . . . EXAMINE CRITICALLY EVERY PROGRAM TO DETERMINE THAT IT WILL IN FACT MAKE A NECESSARY CONTRIBUTION TO COMBAT READINESS . . . . [11].

To determine whether the current Proficiency Flying Program makes necessary contributions to Naval Air Combat Readiness was the broad purpose of this study.

Framework of the Study

Initial study revealed that the broad purpose could best be served by a two-step investigation: (1) comprehensive review of the literature, (2) an experimental test of contributions to combat readiness from the current Proficiency Flying Program. Such an approach has facilitated a maximum contribution to the knowledge while remaining within the environmental constraints. Both steps were designed to gain the greatest insight into the problems of CRT philosophies and measurements and to provide a framework and a bibliography for use in similar future study as well as to serve the stated purpose.

CHAPTER II

REVIEW OF THE LITERATURE

Sources Searched

Background literature relevant to Naval Air Combat Readiness Training, while generally scarce, derives from widespread sources. The search for literature ranged the field of government, military planning and economics, psychology, and several types of military management. By way of personal correspondence, interview, and library research, pertinent literature derived from each of these fields was obtained through persons and agencies shown in Table I.

Selection Criteria

The relative scarcity of pertinent literature dictated a comparatively unconstrained selection criteria. Consequently, any literature touching upon the following subjects was reviewed.

Combat Readiness Training and Proficiency Flying. Any literature encountered which dealt in any way with either Air Force or Navy Combat Readiness Training, any military or civilian flying proficiency programs or criteria, or any study regarding flying currency and individual performance was considered.

Incentive and/or Hazardous Duty Pay. While flight pay was not the subject of the study, it was found that much literature ostensibly devoted to Incentive and/or Hazardous

TABLE I

SOURCES OF PERTINENT LITERATURE

<u>Legislative</u>

U. S. Senator from author's home state

Congressman from author's home district

Mr. Harry L. Wingate, Jr., Chief Clerk, U. S. Senate Committee on Armed Services

Mr. John R. Blandford, Chief Counsel, House of Representatives Committee on Armed Services

<u>Military</u>

Office of the Chief of Naval Operations, Flight Operations Division (OP-53)

U. S. Naval School of Aviation Medicine

U. S. Naval Aviation Safety Center

U. S. Air Force Directorate of Aerospace Safety

Various Navy and Air Force Directives

<u>Academic</u>

Library, U. S. Naval Postgraduate School

Library, U. S. Army Human Research Unit, Monterey

Air University Annotated List of Student Research Reports

Air University Periodical Index (1949-1963)

<u>Other</u>

Federal Air Regulations

Air Line Pilots Association

Duty Pay related to the CRT Program. Unfortunately, the conventional wisdom generated by the mixing of two separate concepts has, on occasion, clouded both. To preclude such an occurence in this study the issue of flight pay was assumed irrelevant[2] and only those portions of such literature which related to readiness and skill retention were considered.

Long Term Retention of Learned Skills. Consideration was given to all available literature relating to long term retention of learned skills. Emphasis was given, of course, to reports regarding retention of pilot skills but such a constraint was not found to be necessary in order to preclude an inundation of information.

Pilot Proficiency Measurement. Any available literature pertinent to the measurement of pilot skills or proficiency was considered relevant and reviewed.

The reader is assured that, as of the date of this report, all unclassified literature pertinent to the above criteria and available from the sources searched has been considered and is listed in the bibliography. The more important works are reviewed in the following paragraphs.

The Review

To facilitate the review, the literature has been classified into three areas: Historical Bases, Official Positions, and Psychological.

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[2] The reader interested in the validity of this assumption is referred to Alain C. Enthoven, Supply and Demand and Military Pay, Rand Corporation Paper P-1186 (Sante Monica: Rand Corporation, 30 September 1957).

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Certain spillovers are evident, but such a format did provide for an orderly investigation and presentation.

Historical Bases. Largely as a result of historical experiences, the entire literature reflects a general conviction that some certain amount of regular flight practice is necessary to safe pilot performance. The Report of the Strauss Commission [25] provides a very lucid presentation of historical reasons for the maintenance of a military Proficiency Flying Program. In the report is recounted the failure of a circa 1930 Marine Corps policy of rotating pilots off flight status. Also included is an accounting of a huge waste of pilot, aircraft, and dollar resources in the re-training of 500 Inactive Reserve aviators who volunteered for active duty at the start of the Korean War. As a result of these, and other, experiences the report found as one of its conclusions:

> Where personal flight proficiency is maintained, the transition from an administrative flying assignment to an operational flying assignment is easy and rapid; where it is allowed to deteriorate the transition is difficult, costly, and too time consuming. . . .

Similar conclusions derived from more recent experiences formed the basis for the 1961 testimony of an Assistant Secretary of Defense:

> . . . it requires intensive application on a continuing basis to accumulate the degree of skill and experience necessary to progress and remain in this career. It is not a qualification which can be attained easily or continued on an off-again-on-again basis [24].

Additionally, flight safety activities have published studies which show that, up to a point, incidence of aircraft accidents is inversely proportional to pilot time [21,28,30]. Still other studies of pro-

ficiency flying have been made and each concludes, on the basis of past performance, that it is prudent to maintain the flying skills of aviators who have future flying potential [3,7,16,21] .

Official Positions. Based upon historical experiences, the military services and each of the non-military agencies queried subscribe to the need for regular flying. Navy and Air Force Directives define the Proficiency Flying Porgrams and, though critical of certain practices, the General Accounting Office officially recognizes the basic need [7] . The Naval Aviation Safety Center goes beyond mere recognition of the need, however, and has provided a report urging the establishment of a "Professional Carrier Jet Pilot Program [27] . Participants in such a program would maintain proficiency through continuous cockpit assignment thereby precluding loss of basic flying skills. The report hypothesizes that the risk now inherent in transitioning from proficiency to cockpit assignment would be eliminated with a consequent increase in readiness and decrease in resource expenditure. While the proposal would do much to enhance aviation readiness, the question of whether or not it suboptimizes the broader problem of overall Navy readiness is not answered. The fact that a proposal of this type has been made by such a responsible agency, however, is, in itself, a strong case in point for some sort of program for the maintenance of basic flying skills. On the non-military side, with regard to commercial pilots in particular, the Civil Aeronautics Board lays down current proficiency requirements and the Air Line Pilots Association is in complete agreement with their

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position [1] . Thus, the major agencies concerned with retention of basic flying skills encourage and require frequent practice toward such retention. With the exception of the Safety Center's report, however, none of the official directives or papers offer detailed reasons for their requirements. The chance exists that they all agree with the thoughts expressed in a letter received from the Naval School of Aviation Medicine:

> Assumptions are made as to the possible deleterious effects of lack of practice in flying . . . But like most of the problems in life, decisions on these things are based on general experience and common sense rather than research data [29].

Psychological. Psychological study offers the best opportunity for gathering the research data needed to preclude potentially wasteful "common sense" decisions. For years, the measurement of pilot proficiency, either in or out of an aircraft, has been beset by a multitude of theoretical and practical difficulties. This is due to many factors, but especially to rater reliability, differences in flight situations, and gaps in the understanding of the basic nature of the flying task. That same letter from the Naval School of Aviation Medicine contained a succinct summation of the problems which face researchers:

> First, when research is done on learned skills it is usually on some relatively simple skill such as the pursuit rotor or something of the sort; but pilot skills (or driving skills) are very complex composites of intellectually controlled psychomotor activities. We have no demonstrably valid way of getting comparative measurements of such complex skills among groups of aviators, and since we cannot measure them, questions of long term retention become unanswerable.

The situation is not quite that hopeless, however; the Naval Training

Device Center and the Air Force have sponsored several studies of significance in this area.

Naval Training Device Center studies treat, primarily, the use of the synthetic flight trainer in maintaining basic pilot skills. There does exist a high probability that properly instrumented and programmed trainers can, at some future time, take the place of the entire Proficiency Flying Program in the maintenance of basic pilot skills. There is other value in the reports of the Center, however. One of the most significant papers in the entire literature review was prepared by the Franklin Institute for the Training Device Center [20]. This report developed methods of controlling several of the variables so disconcerting to other researchers and, in laboratory conditions, observers were actually able to differentiate between "natural" and "mechanical" aviators in a scientific manner. Aviators have suspected the existence of such a measure for years and refinement of the technique could save uncounted proficiency flying resources. The report is highly recommended to other researchers.

Though the Franklin Institute study is extremely promising, other methods of pilot performance measure cannot be neglected. A summary of all proficiency measurement tools under development has been compiled at the Behavioral Sciences Laboratory, Wright-Patterson Air Force Base [4]. Few of the reports listed deal directly with the proficiency measurement of pilots performing their complex tasks but broad guidelines toward the selection of measurement criteria are presented. The paper should be considered in any research dealing with

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measurement and long-term retention of learned skills.

Working under Air Force contract, Naylor and Briggs [17] recognized the ability to retain a learned skill over extended time periods is a problem which has, as yet, not been too thoroughly explored. In fact, the definition for "long-term" in some studies is anything over 24 hours! Nevertheless, in reviewing the literature on the subject, they isolated a large number of variables and, amongst other things, discussed two parameters of much interest in the retention of basic flying skills: (1) retention as a function of conditions surrounding original learning, (2) conditions existing during the interim period. Their general conclusions with regard to these parameters were:

1. Large losses in skill occur over time; however, the actual function of the decrement appears to be specific to the particular situational parameters.

2. Rehearsal facilitates skill retention, and the greater the degree of overt experience . . . the greater the facilitation.

3. The poorer the fidelity of the rehearsal task to the previously learned task, the less beneficial is rehearsal.

The conclusions might be restated in terms of pilot skills and proficiency flying:

1. Large losses in skill occur over time; however, the actual function of the decrement appears to be specific to the particular type and frequency of flying.

2. Flying facilitates skill retention, and the greater the amount of flying experience the greater the facilitation.

3. The less similarity between type of operational flying and the type of previous proficiency flying, the less beneficial the proficiency flying.

These postulated modifications to the conclusions of others have been tested by the experiment.

CHAPTER III

THE EXPERIMENT

Background

Current proficiency flight hour requirements are based largely upon historical "common sense" experiences with only isolated un-controlled and recorded observations of performance. There exist vague notions that more flight time, more jet time, or more carrier landings make for a better carrier jet pilot, for example, but again, very little scientific experimentation has been conducted. Safety Centers and psychologists have compiled statistics demonstrating the correlation between current flying and accident rate [28,31] , but surley, to await an accident is an expensive way of measuring the worth of a concept. Paralleling this situation is the notion that all pilots, regardless of background or potential, need the same number of flight hours per year to maintain their basic flying skills [10] . Other than for possible administrative convenience, no logical bases for such policies was unearthed in the review of the literature and for this reason an experimental test of these notions was devised.

The subjects of the test were a group of 85 Naval Aviators who completed a replacement training squadron jet instrument flight syllabus between June 1 and December 1, 1963. All the subjects were Fleet Replacement Pilots reporting for transition training from either sea duty proficiency assignment or shore duty. The instrument training phase was selected for observation since it is the first flight phase of transition training. Intuitively and by assumption such an initial phase is most influenced by and indicative of previous flight experience.

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The instrument training phase is conducted in the TF-9J aircraft and normally consists of ten scheduled flights. Students may, however, skip certain flights or be required to fly extra flights depending upon their individual progress. Instructors grade each flight on about 20 performance characteristics and then sum the individual grades for an overall flight grade. The grades awarded are "Good" (G), "Average"(A), "Below Average" (BA), and "Unsatisfactory" (U). Any one "Unsatisfactory" on a flight causes the whole flight to be unsatisfactory. The instructors strive for a unit grade distribution of 20 per cent "Good," 60 per cent "Average," and 20 per cent combined "Below Average" and "Unsatisfactory." Actual totals for the observed time period were 20 per cent, 62 per cent, and 18 per cent, respectively.

Assumptions

For purposes of the experiment, it was assumed that the instrument phase grades result from pilot background (including proficiency flying) and are indicative of pilot readiness. In accordance with pertinent learning theory, those who are "less ready" in the beginning of the training will make greater relative improvement during the course of instruction, but since the grades cover the entire length of the syllabus there is valid basis for the assumption.

It was recognized that motivation is highly influential in the determination of syllabus progress, but a second assumption was that pilots reporting to a carrier jet squadron are universally well motivated and any categorization of the trait could only be "better" and "Better yet." Competition for cockpit assignment is keen and only a

well-motivated individual could attain it. Differences in performance, therefore, can only be attributed to differences in basic abilities or background.

The Problem

Utilizing the assumption that the observed instrument flight grades are indicative of readiness as the criteria, the problem to which the experiment addressed itself was:

> Determine the contributions of CRT, proficiency flight, experiences to the readiness of the observed group of pilots.

Such a determination offers a vehicle for obtaining the maximum value for each CRT flight dollar spent.

Procedures

The method of the experiment was primarily computational. The first phase was a tabulation of the instrument flight grades of each of the 85 pilot subjects. To facilitate data handling, syllabus totals for each individual were reduced to a point score through use of an algebraic formula:

$$\text{Score} = \frac{4G + 3A + 2BA + 1U}{G + A + BA + U}$$

By this method, an individual progressing through the syllabus with all "Average" flights would get a point score of 3.0. No special penalties were assigned for extra flights and no bonuses were granted for completing in less than the normally required ten flights.

The second phase of the experiment was the ascertainment of the individual subjects' flight backgrounds. This was done by a mailed questionnaire. Due to certain circumstances, seven addresses could not be obtained and these questionnaires were not mailed. Of the other 78 subjects, replies were received from 57. At the time of the initial tabulation there was no positive way of determining which of the subject pilots were newly designated aviators reporting directly from the Naval Air Training Command. Their replacement squadron progress was, of course, incidental to the problem and, as they became identified through questionnaire replies, they were eliminated from the study. This left 39 subjects who responded and about whom data was available and pertinent.

The third and final phase of the experiment was the statistical search for relevant relationships between background variables and the criteria by comparing the former with the latter. The first two variables listed could be markedly affected by presently feasible adjustments in the Proficiency Flying Program and the determination of their contribution was of first importance in the experiment. Additionally, comparison of the first variable with the criteria tested Postulate 3 of Chapter II: "The less the similarity between the type of operational flying and the type of previous proficiency flying, the less beneficial the proficiency flying." Variables:

1. Model aircraft most flown during the most recent proficiency assignment.
2. Months since last jet flight.

The second two variables may be feasibly controlled by Bureau of Naval

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Personnel officer assignment rotation policies. Were the variables to prove significant, however, controlled adjustments might be made in the Proficiency Flying Program in lieu of more desireable (from the aviator's viewpoint) rotation policy changes. In addition, comparison of the third variable tested Postulate 1 of Chapter II: ". . . losses in skill occur over time . . ." Variables:

3. Months since last regular flying assignment.

4. Model aircraft flown in last regular flying assignment.

The last pair of variables which were compared are a product of total flight background rather than mere proficiency experience, but the determination of their contribution to readiness could indicate possible further adjustments in the Proficiency Flying Program as well as to test Postulate 2 of Chapter II: ". . . the greater the amount of flying experience the greater the skill retention." Variables:

5. Total jet flight hours.

6. Total flight hours.

Instrument syllabus performance and background data pertinent to the variables and arranged according to the definitions stated below are presented in Table II.

Definitions

In the listing of the variables, and in Table II, Model aircraft was defined at "Jet" or "Prop" rather than differentiation by specific model such as "A4" or "A1." Respondents who flew at least 20 per cent

TABLE II

PERFORMANCE AND BACKGROUND OF SUBJECT PILOTS

	Total flight hours	Total jet hours	Months since last regular flying	Model flown last regular flying	Model CRT aircraft flown	Months since last jet flight	Grade
1	5154	600	52	Jet	Prop	52	2.90
2	3000	200	3	Prop	- -	48	2.80
3	828	677	1	Jet	- -	1	3.20
4	1500	1350	25	Jet	Jet	3	3.22
5	1730	1415	23	Jet	Prop	23	3.22
6	2815	1050	41	Jet	Mix	3	2.90
7	2700	2100	48	Jet	Mix	1	3.67
8	3400	30	36	Prop	Prop	48	2.90
9	2200	200	2	Prop	Prop	2	2.85
10	934	184	0	Prop	- -	0	2.85
11	2260	145	38	Prop	Mix	3	2.80
12	3000	1800	30	Jet	Mix	6	3.70
13	2600	1000	36	Jet	Jet	1	3.20
14	3900	1240	7	Jet	Prop	7	3.86
15	2900	874	12	Jet	Prop	12	3.71
16	2620	25	24	Prop	Prop	1	2.90
17	3300	1150	55	Jet	Mix	2	3.50
18	2967	2132	35	Jet	Mix	1	3.00
19	3607	790	26	Jet	Prop	26	3.10
20	4300	750	16	Jet	Mix	1	3.50
21	3300	700	36	Prop	Mix	1	3.30
22	1900	1650	27	Jet	Jet	1	3.10
23	4200	600	36	Jet	Mix	1	3.00
24	4700	700	72	Jet	Prop	60	2.70
25	2930	995	15	Jet	Mix	1	3.40
26	1600	1200	44	Jet	Mix	6	2.90
27	1403	458	36	Prop	Prop	45	2.90
28	970	320	1	Prop	- -	1	3.34
29	4870	400	0	Prop	- -	1	2.90
30	1700	1200	40	Jet	Mix	6	3.20
31	850	200	1	Prop	- -	1	3.10
32	908	338	1	Prop	- -	1	3.00
33	876	175	2	Prop	- -	1	3.10
34	1030	360	1	Prop	- -	1	2.50
35	1850	380	42	Jet	Mix	6	2.90
36	2706	71	49	Prop	Mix	1	2.80
37	1422	1200	37	Jet	Jet	1	3.45
38	2400	875	0	Jet	- -	0	3.00
39	2780	1400	1	Jet	- -	1	3.38

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of their proficiency time in each model ("Jet" and "Prop") were assigned the category "Mix" for study purposes.

Proficiency assignment was defined as a duty assignment wherein the aviator averages less than ten flight hours per month over a six month period.

Regular flying is flying other than for mere flight proficiency and usually involves duty in a combat or support squadron or instructor duty in the Naval Air Training Command.

In comparing the variables with the flight grade criteria , the subjects were grouped in naturally occuring clusters which appeared in graphical plots of data. Overall instrument grades for each cluster were then computed and compared with each other and with the overall sample instrument flight grades. The results have been presented in this format.

Results

Results have been derived by comparing each investigated variable with the instrument flight grade criteria. Data thus obtained is tabulated below.

Overall instrument flight grades for the 39 subject group were:

Range: 2.50 - 3.86

Median: 3.00

Mean: 3.05

Comparison 1: Model aircraft most flown during the most recent proficiency assignment.

Model Flown	Number Pilots	Grade Range			Median Grade	Mean Grade
Prop	10	2.70	-	3.86	2.95	3.12
Mix	14	2.80	-	3.70	3.10	3.19
Jet	4	3.10	-	3.45	3.21	3.24

In accordance with the study definition of proficiency flying, only respondents with more than six months in proficiency assignment were considered in this category.

Comparison 2: Months since last jet flight.

Elapsed Months	Number Pilots	Grade Range			Median Grade	Mean Grade
0 - 3	25	2.50	-	3.67	3.10	3.11
6 - 12	7	2.90	-	3.86	3.20	3.33
Over 13	7	2.70	-	3.22	2.90	2.93

The discontinuity of the data was further investigated. On the hypothesis that certain pilots classified as having flown jet equipment within the past three months were so classified on the basis of one or two flights arranged when orders to a jet squadron materialized, the 0 - 3 month category was divided according to model aircraft most flown during the most recent assignment:

Elapsed Months	Model Flown	Number Pilots	Grade Range			Median Grade	Mean Grade
0 - 3	Prop	8	2.50	-	3.10	2.90	2.91
0 - 3	Mix	11	2.80	-	3.67	3.30	3.20
0 - 3	Jet	6	3.10	-	3.45	3.21	3.26

Though the additional analysis did not alter the discontinuity, further investigation was not attempted.

Comparison 3: Months since last regular flying assignment.

Elapsed Months	Number Pilots	Grade Range			Median Grade	Mean Grade
0 - 3	11	2.50	-	3.38	3.00	3.00
7 - 16	5	3.00	-	3.86	3.50	3.49
23 - 30	6	2.90	-	3.70	3.16	3.21
35 - 38	8	2.80	-	3.45	3.00	3.07
40 - 72	9	2.70	-	3.67	2.90	3.05

Comparison 4: Model aircraft flown in last regular flying assignment.

Model Flown	Number Pilots	Grade Range			Median Grade	Mean Grade
Prop	15	2.50	-	3.34	2.90	2.93
Jet	24	2.70	-	3.86	3.20	3.11

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Comparison 5: Total jet flight hours.

Jet Hours	Number Pilots	Grade Range	Median Grade	Mean Grade
25 - 200	9	2.80 - 3.10	2.85	2.90
300 - 400	6	2.50 - 3.34	2.90	2.92
600 - 900	9	2.70 - 3.71	3.10	3.16
1000 - 1450	11	2.90 - 3.86	3.22	3.29
Over 1650	4	3.00 - 3.67	3.38	3.36

Comparison 6: Total flight hours.

Total Hours	Number Pilots	Grade Range	Median Grade	Mean Grade
800 - 1050	7	2.50 - 3.34	3.10	3.02
1400 - 1900	8	2.90 - 3.45	3.15	3.12
2200 - 3000	14	2.80 - 3.71	3.00	3.15
Over 3300	10	2.70 - 3.86	3.05	3.17

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CHAPTER IV

CONCLUSIONS

The following conclusions are based upon the review of the literature and the experiment conducted.

The CRT/Proficiency Flying Concept

Though the CRT/proficiency flying concept grew out of the pre-World War II era and has been little modified since 1950, it is basically sound. No incidents or data were revealed which refuted the historical experiences of the 1930 Marine Corps or the 1950 Naval Reserves. Indeed, the results of the experiment confirm that large losses in skill occur over time. Given the present officer career rotation pattern, this is reason enough to implement the concept.

Contributions To Readiness

Based upon the data and the comparisons presented in Chapter III, the following relationships have been established. Readiness to fly a jet carrier aircraft is a function of at least these variables:

1. Model aircraft flown in proficiency assignment.
2. Time since last jet flight.
3. Time since last regular flying assignment.
4. Model aircraft flown previously.
5. Total jet flight hours.
6. Total flight hours.

With the exception of the variable, "Time since last jet flight," the data is consistent and significant. Additionally, the three postulates derived from the "Psychological" section of Chapter II have been proven

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and are now stated as conclusions.

1. Large losses in skill occur over time; however, the actual function of the decrement is specific to the particular type of flying.

2. Flying facilitates skill retention and the greater the amount of flight time the greater the facilitation.

3. The less similarity between the type of operational flying and the type of previous proficiency flying, the less beneficial the proficiency flying.

Implications of the Study

The data compiled and the conclusions derived can be most useful in re-adjusting current CRT emphases. For example, all Category I[3] aviators must meet the same minimum proficiency flight requirements regardless of their status with regard to future potential and the six variables treated in this study [10]. Definition and testing of these variables paves the way for enhancing the efficiency of and economizing in the Naval Air Combat Readiness Training Program.

Though the study was directed to a jet carrier training environment, the method is easily modified for use with other situations. A universal potential use for such findings is in programming the flight training plans of all types of replacement squadrons. By detecting and computing the relevant background variables of each

[3]Category I consists, essentially, of those aviators with less than 20 years flight experience and under 45 years of age.

newly reported Fleet Replacement Pilot, plans could be made accordingly and scarce resources conserved. For example, a pilot of the proper background category could then be programmed for eight instrument flights rather than scheduled for the standard ten. Such programming, in conjunction with other relatively simple statistical methods, could save significant amounts of manpower, aircraft, and dollar resources.

A study framework has been established, a bibliography compiled, and selected flight background variables tested. The way stands clear for future official and academic endeavors to investigate further the value of Naval Air Combat Readiness Training.

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